Obituary

Charles P. Slichter
January 21, 1924 - February 19, 2018

Charlie Slichter was a pioneer of magnetic resonance as well as condensed matter physics. He was highly respected by both communities as he shaped magnetic resonance by using it in the most fundamental way to prove or disprove new condensed matter theory. He originated from the Harvard strand (Purcell) of magnetic resonance, and accomplished most of his discoveries and inventions at the University of Illinois at Urbana-Champaign which he joined already in 1949, the year he received his PhD. Today, perhaps more than ever before, a large magnetic resonance community knows about his proof of Overhauser's theory of DNP with the first electron-nucleus double resonance experiments, with his student Carver in 1953. Another early, fundamental contribution concerned the determination of the absolute value of the spin susceptibility of metallic electrons which Pauli had calculated. By using a sequential version of the DNP double resonance experiment, together with his student Schumacher they measured the electronic spin contribution in 1954. When Bardeen was thinking that a gap in the electronic density of states must be behind superconductivity (that had evaded explanation since 1911), Slichter concluded that this must show up in nuclear relaxation. But that superconductivity was known to break down in even small magnetic fields, so how to do NMR? I must admit that I studied his 1957 paper only in 1997, after I had spent more than a year in Slichter's lab trying to prove or disprove the so-called stripe-model (spatial modulations of spin and charge) in high-temperature superconductors. I emerged totally discouraged from reading, and I told him. It was about field cycling, spin-temperature, and relaxation by superconducting electrons when they break up, all accomplished in 1957 the year Bardeen, Cooper, Schrieffer formulated their famous BCS theory of superconductivity. This brings up the other side of Charlie Slichter. He was able to make you feel important within a minute, up and fit for the neXt experiment that could change the world.

Of course, the discovery of the indirect spin-spin coupling with Gutowsky, surface studies of platinum, the invention of the coherent NMR spectrometer, we all use today, McMillan's charge-density waves, the Kondo-effect, ultraslow motion, relaxation in the rotating frame,
color centers, and many more discoveries or inventions in physics and chemistry carry his mark. With the discovery of high-temperature superconductivity by Bednorz and Müller in 1986, NMR spectrometers all over the world were searching for the Hebel-Slichter peak - to no avail. Slichter started a few years late, but with the most careful experiments in the field he contributed fundamental evidence, in lack of theory. These were the gold rush years, but he stayed close to the experiments and away from assuming theory. For example, he never trusted the NMR shift analysis that was used in major conclusions, and he pushed me not to give up on decisive experiments when most regarded the problem solved. He was right, as we found out not long ago, although the clues for the theory may not be telling enough. He enjoyed our recent progress during long discussions, but also became more and more interested by recent progress with DNP, again.

Students must know, that, of course, not all envisioned experiments succeeded. What about those who failed, for whatever reasons, at the frontiers of science? Perhaps nobody knows all details, but Mansfield belongs to that group, and he valued his time in Urbana the most, before he went on to change magnetic resonance imaging forever. Charlie Slichter received many honors for his ground breaking work, among them the Buckley Prize in 1996, and the National Medal of Science in 2007. He served on a number of boards, among them the President’s Science Advisory Committee, and the Harvard Corporation.

Of course, we all know his book, Principles of Magnetic Resonance, to a certain degree, designed as a text book for physics graduate students. And if we really want to understand some topics it offers perhaps the deepest advice there is. With hardly a paragraph not thought over many times, it remains a fundamental reference even for us insiders, and I know, also for hard-core theorists.

At the ,50 years of condensed matter‘ celebration in Urbana in 2005, Leo Kadano (University of Chicago), and during this honorable doctor celebration in Leipzig 2010 (the picture), Alex Müller (University of Zurich), made it clear why, today, international science has lost so much. One of the deepest thinkers of his generation, with nearly infinite enthusiasm, the kindest and warmest person one can know, committed to the highest standards in all respects of life. A scientist who was concerned about content, not where it was published. The hardest work paired with joy. Laughter and fun in the lab were not rare, neither at the many parties at his family home where he indulged in serving us all.

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